

OBSERVATIONS ON THE LIFE HISTORY AND HABITS OF
ENDALUS CELATUS BURKE (COLEOPTERA:
CURCULIONIDAE)¹VERYL V. BOARD AND HORACE R. BURKE²Department of Entomology, Texas A&M University,
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ABSTRACT

The life history and habits of *Endalus celatus* Burke on *Marsilea mucronata* A. Br. in Texas are discussed. Eggs are deposited in the sporocarps of this plant, with the developing larvae feeding on the spores. Pupation occurs in the larval feeding cavity. The weevil larvae are parasitized by *Trimeromicrus* sp. (Pteromalidae) and *Bracon punctatus* (Mues.) (Braconidae). Photographs are provided for the adult, larval, and pupal stages of the weevil and the host plant.

Endalus celatus was originally described from a single male collected at College Station, Texas (Burke 1961). Approximately 2 years later a female of the species was taken near Alamo, Hidalgo Co., in southern Texas (Burke 1965). Despite the striking secondary sexual differences and the fact that the sexes had not been taken together, there was little doubt that these specimens were conspecific. Because of the peculiar rostral and dorsal setae which it bears (Fig. 1, 2), *E. celatus* is the most easily recognized member of the genus. Both of the specimens mentioned above were collected by sweeping mixed vegetation around small ponds. Attempts to obtain additional specimens and to learn something about the life history, habits, and host of the species were unsuccessful until June 1969.

At that time 3 specimens were collected while sweeping emergent vegetation in a small pond near Corpus Christi, Texas. Plants of the genus *Marsilea* (Pteridophyta, Marsileaceae) were abundant in the area, but it could not be determined then if the weevils came from these plants. The following year *Marsilea mucronata* A. Br. near College Station was examined periodically for evidence of weevil association. Adult weevils were finally found on May 20 at the bases of these plants and numerous specimens were subsequently reared from the sporocarps. The abundance of both plants and weevils presented us an excellent opportunity to make observations on the life history and habits of the latter. Little is known about the biology of weevils of the genus *Endalus* and, to our knowledge, no weevil species has heretofore been reported to be associated with *Marsilea*.

Endalus celatus is presently known only from Texas. Weevils have been collected in the south, central, and northwestern areas of the state. Now that the host has been found, additional collecting in likely areas will undoubtedly increase the known range of the weevil.

Correll and Johnston (1970) recognized 5 species of *Marsilea* in Texas. Several other species occur elsewhere in North America. The fronds of *Marsilea mucronata* resemble the leaves of a four-leaf clover (Fig. 3). The sporocarps are borne either at or near the soil or water level or on pedun-

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cles up to 2 inches above the surface. In the area where most of our observations were made, *M. mucronata* grows mostly along the banks of the river immediately adjacent to the water. Sometimes dense mats of these plants cover still, shallow water and bare mud and rocks on the shore.

Adult weevils may be found during the day at the bases or among the roots of the plants. After dusk they ascend the plants and come to rest on the petioles and fronds. Adults feed by chewing notches in the edges of the fronds. They were probably active prior to the May 20 date as we had not yet learned where to look for them.

Female weevils chew an opening in the side of the sporocarp through which they deposit the eggs. The eggs are placed between the rows of sporangia on each valve of the sporocarp. The number of eggs deposited in the sporocarp varies from 1 to 6, and all appear to be inserted through the same hole. Eggs and medium-size larvae are sometimes found in the same sporocarp, indicating that multiple egg depositions may occur. The oviposition puncture is sealed by the female after egg deposition is completed. The first eggs and larvae were found on June 16, but plant growth had been delayed by extensive flooding of the river that spring, probably delaying weevil development.

After hatching, the young larva begins feeding on the spores in 1 valve of the sporocarp. If several larvae are present they may consume all of the spores in the valve. There are usually 2 or 3 larvae (Fig. 4) in each

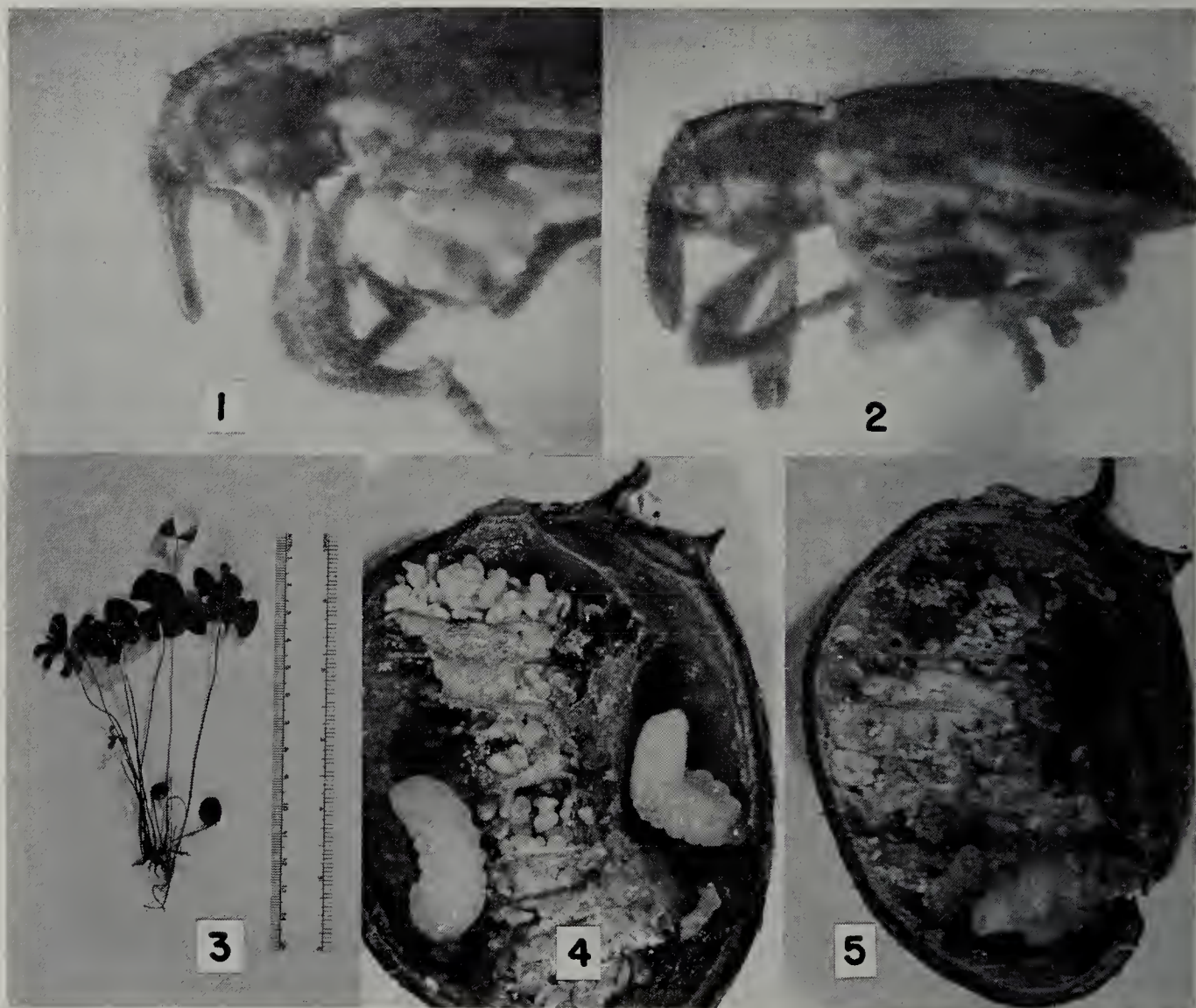


Fig. 1-2, 4-5: *Endalus celatus*, 1) female, 2) male, 4) larvae in sporocarp of *M. mucronata*, 5) pupa in sporocarp of *M. mucronata*.

Fig. 3: The host plant: *Marsilea mucronata*.

sporocarp but as many as 5 have been observed. Three larval instars have been observed, each of which has an average duration of about 5 days. The maximum duration observed for the last instar was about 10 days.

Pupation occurs within the cavity formed by the feeding of the larva (Fig. 5). The minimum duration observed for the pupal stage was 3 days; the maximum 7 days. The newly emerged adult remains quiescent in the sporocarp for about 1 day, after which time it usually exits through the original oviposition hole. In cases where there are several individuals in each sporocarp, other exit holes may be made by the adults.

We found *Trimeromicrus* sp. (Pteromalidae) (det. B. D. Burks, USDA) and *Bracon punctatus* (Mues.) (Braconidae) (det. P. M. Marsh, USDA) to be parasitic on the weevil larvae. The pteromalid was by far the most abundant, constituting nearly 70% of the parasites reared. Oviposition by the wasps was not observed. We did find, in the sporocarps, eggs which were presumably those deposited by the parasites. These eggs had been placed on the sporangia near the egg or young larva of the weevil. Wasp larvae were observed to feed externally on the posterior region of weevil larvae. The pteromalid apparently attacks only a single larva but we observed the braconid attacking several weevil larvae in the same sporocarp. Both wasps pupate in the sporocarp near the remains of their hosts. Emergence is probably through the oviposition puncture of the weevil since no other exit holes have been seen. The frequency of parasitism varies greatly. About 60% of the first generation weevil larvae were parasitized, but parasitism dropped to about 10% in later generations.

Endalus celatus has several generations each year. There are indications that these overlap considerably. *Marsilea mucronata* spreads vegetatively during the entire growing season with new sporocarps continuously being formed throughout the period, insuring plentiful food for weevil larvae. The first sporocarps of the season were observed on June 16; the last on September 11.

Adults of other species of *Endalus* (*E. aeratus* LeC.; *E.* sp., near *aeratus* LeC.; and *E. setosus* LeC.) have been collected on *Marsilea mucronata* during this study, but the details of their biologies have not yet been worked out. Weevil larvae have been found mining fronds and boring in petioles and rhizoids. These are presumably larvae of one or more of the species of *Endalus* listed above, although attempts to rear them have not yet been successful. All other *Endalus* (*E. limatulus* (Gyll.), *E. punctatus* LeC., and *E. depressus* Burke)), for which host data are available are associated with plants of the family Cyperaceae. It is now evident that, on the basis of food plants, there are 2 species groups in the genus; this is supported to some extent by morphological characters.

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